

Ain Shams University Faculty of Science Chemistry Department

### Development of Electrochemical Sensors Based on Electro-polymerized Materials for Determination of Some Clinically and Environmentally Relevant Species

#### **A Thesis**

Submitted to Chemistry Department – Faculty of Science – Ain Shams University for Requirements of the Degree of Doctor of Philosophy (Ph.D) of Science in Chemistry

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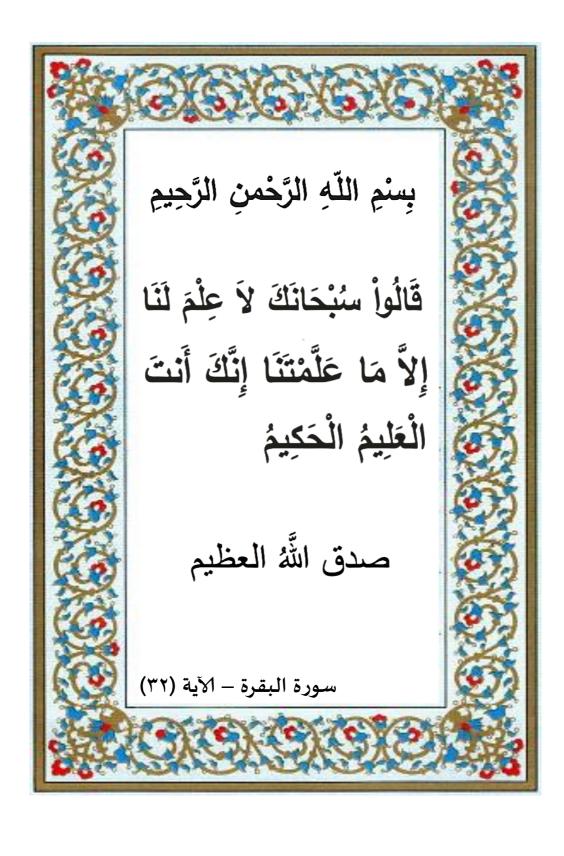
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# Dedication

I do appreciate my god for giving me great father and mother who are enlightening and always supporting me in all my life

I also thank my family for continuous encouragement and help

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# **Abbreviations**

Abbreviation	Full name
2-AP	2-Aminophenol
4-ABA	4-Aminobenzoic acid
4-NP	4-Nitrophenol
A	Surface area
AA	Ascorbic acid
AFM	Atomic force microscopy
AGCE	Activated glassy carbon electrode
c	Concentration
CA	Chronoamperometry
CAP	Chloramphenicol
CC	Catechol
CMEs	Chemically modified electrodes
CNTs	Carbon nanotubes
СР	Chronopotentiometry
CV	Cyclic voltammetry
CVD	Carbon vapor deposition
DA	Dopamine
DPV	Differential pulse voltammetry

$\mathbf{D}_{\mathbf{R}}$	Diffusion coefficient
EDX	Energy dispersive X-ray spectroscopy
$\mathbf{E}_{\mathbf{p}}$	Peak potential
E'°	Standard formal potential
FTIR	Fourier transform infrared spectroscopy
GC	Gas chromatography
GCE	Glassy carbon electrode
HPLC	High-performance liquid chromatography
HQ	Hydroquinone
$\mathbf{I}_{\mathbf{p}}$	Peak current
$\mathbf{k}_{\mathrm{s}}$	Apparent heterogeneous rate constant
LOD	Lower limit of detection
LSV	Linear sweep voltammetry
MS	Mass spectrometry
MWCNTs	Multi-walled carbon nanotubes
n	Number of electrons transferred
NPV	Normal pulse voltammetry
p-ABSA	p-Aminobenzene sulfonic acid
PBS	Phosphate buffered solution
p-DAN	Poly(1,5-diaminonaphthalene)

PMEs	Polymer-modified electrodes
PNT	p-Nitrotoluene
R.S.D	Relative standard deviation
RC	Resorcinol
SAM	Self-assmbled-monolayers
SCE	Saturated calomel electrode
SEM	Scanning electron microscopy
SFGs	Surface functional groups
SPM	Scanning probe microscopy
STM	Scanning tunneling microscopy
SWCNTs	Single-walled carbon nanotubes
SWV	Square wave voltammetry
TEM	Transmission electron microscopy
UA	Uric acid
UGCE	Unactivated glassy carbon electrode
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction spectroscopy
α	Electron transfer coefficient
υ	Scan rate

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